

1025
711025

File Copy

5 cps 9/16/57
8/16/57

A STUDY OF PERSONALITY CORRELATES OF
JUDGMENT BEHAVIOR

Please Return to:
Chief of Naval Research (Code 458)
Department of the Navy
Washington 25, D. C.

BY
C. L. WINDER AND KENNETH R. WURTZ

TECHNICAL REPORT NO. 6

PREPARED UNDER CONTRACT Nonr 225 (01)
(NR-150-087)
FOR
OFFICE OF NAVAL RESEARCH



DEPARTMENT OF PSYCHOLOGY
STANFORD UNIVERSITY
STANFORD, CALIFORNIA

AUGUST 31, 1954

8/16/57
D.D.C.
REFILED
SEP 8 1970
RECORDED

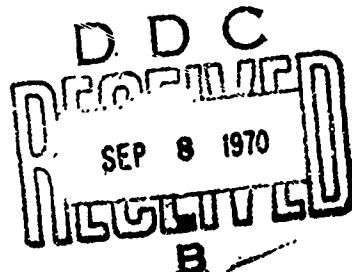
A STUDY OF SOME PERSONALITY CORRELATES OF JUDGMENT BEHAVIOR

by

C. L. WINDER AND KENNETH R. WURTZ

Technical Report 6

Prepared under Contract Nonr 225 (01)
(NR 150-087)
for
Office of Naval Research



DEPARTMENT OF PSYCHOLOGY
STANFORD UNIVERSITY
STANFORD, CALIFORNIA

August 31, 1954

This document has been approved
for public release and sale; its
distribution is unlimited.

FOREWORD

The investigation reported here is related to a general program of research on thinking now in progress in the Department of Psychology at Stanford University.

This study was carried out under provisions of Project NR 150-087 supported by Contract Nonr 225 (01) between Stanford University and the Office of Naval Research. Appreciation is expressed to the cognizant ONR Scientific Officer, Dr. D. D. Smith, Head, Personnel and Training Branch, Psychological Sciences Division. Permission is granted to the United States Government for reproduction, translation, publication, use, and disposal of this report in whole or in part.

A list of the technical reports and journal articles available to date from the Stanford program of research on thinking is on pages 21-22.

C. L. Winder
Principal Investigator

TABLE OF CONTENTS

	Page
INTRODUCTION	1
PROCEDURE	2
RESULTS	5
DISCUSSION AND CONCLUSIONS	14
SUMMARY	18

INTRODUCTION

The fundamental viewpoint which furnishes the context for this study is that the functioning adult human organism should be conceptualized in terms which provide for an ego or central analyzer-integrator function. Given such a point of view one expects that there will be a high degree of selectivity in responses to the vast array of discriminable situations in which the organism finds itself. One also expects to find that given some degree of ambiguity in instruction or procedure there will be similarities from situation to situation or task to task in the way in which adjustment is made. More specifically, the natural approach to any given problem will vary in degree, at least, from individual to individual and there will be a significant degree of intraindividual consistency in any given function from task to task or situation to situation. In other words, each ego has unique operational characteristics which are relatively stable. That this is the case regarding certain response characteristics or performance variables of judgment behavior has already been demonstrated (2).

A next inference within this framework is that there is some degree of congruence between different functional systems. For example, individuals who are low or high on particular performance variables would be expected to be also low or high coordinately on certain self-description variables and self-concept variables. The point being made is that if the ego or analyzer-integrator is to be thought of as extending through all levels and systems of the organism, then there should be at least low-order correlations between the characteristics of different functional systems given equivalent or very nearly equivalent psycho-social circumstances. In

general, one would expect that the modes of response to the demands of reality would be similar in a variety of different types of situations.

The goal of the present study is to explore the proposition that characteristics of very different systems of the person are related. This study is a fairly close parallel to one conducted by Block (1) and was undertaken in part in an effort to confirm some of his findings which are very challenging.

The actual operations to be carried out are the following: Each subject will take two personality tests; also, each subject will perform on a psycho-physical judgment task. This task will yield information regarding the characteristic approach to making judgments, at least of a type. The Ss will be divided into three confidence groups: those who are consistently confident, those who are consistently low in confidence, and those who vary their confidence level appropriately depending on the difficulty of the particular judgment being made. The problem is to determine if there are clusters of personality characteristics which differentiate the three groups. (A hypothetically possible fourth group will probably not materialize in this population of subjects, i.e., those who are relatively variable in the confidence levels selected but this variability is inversely related to the difficulty of the task). The Ss will also be divided into two groups according to the speed with which decisions are made. Again, the problem is to find if personality differences appear.

PROCEDURE

Subjects. The Ss were 64 male Stanford students enrolled in the introductory psychology course, all of whom volunteered for this study. Only men were used in order to avoid the complication of possible sex differences.

Sequence. Before starting any specific tasks in the experiment, each S was given a general introduction in which he was told that the experiment was important and that it was being done on a Navy Contract. Following this introduction, Ss were given the two personality tests to take with them and complete. Each S was asked to bring the personality measures with him for his next scheduled appointment at which time he did the psychophysical task.

Personality Measures. The first personality test used was the Minnesota Multiphasic Personality Inventory. The booklet form was given according to standard instructions. This test yields scores on four validity scales, nine clinical scales, and certain other scores on special scales. The test consists of a large number of statements which are answered as being true or false for the person taking the test.

The second personality measure was the Adjective Check-List which consists of a list of 284 adjectives alphabetically arranged. The following directions appeared on the front of each test booklet: "Here is a list of adjectives. Please read them quickly and put a check mark in front of each one you would consider to be self-descriptive. Do not worry about duplications, contradictions, etc. Work quickly and do not spend much time on any one adjective. Try to be frank and check those adjectives which describe you as you really are, not as you would like to be." From these check-lists it is possible to determine if there are differences among Ss in the three groups described above in self-concept as measured in this way.

Psychophysical Task. This is a linear discrimination task in which the Ss are asked to decide which half of a line is longer. On each of 24 cards, a horizontal line is divided near the center by a short vertical line into a standard length of 50 mm. and a variable length, the standard length being

on the left on 12 cards and on the right on the others. Twelve variable lengths were used, each occurring twice. These were of varied difficulty as indicated below by the numbers in parentheses (number 1 most difficult and number 6 least difficult). The variable lengths were as follows: 46 mm. (6), 47 mm. (5), 48 mm. (4), 48.5 mm. (3), 49 mm. (2), 49.5 mm. (1), 50.5 mm. (1), 51 mm. (2), 51.5 mm. (3), 52 mm. (4), 53 mm. (5), 54 mm. (6).

The cards were presented one at a time in random order, except that no repetitions were permitted. The room was darkened after S was given instructions and had no further questions about the procedure. Immediately, the first card was presented in the apparatus used. E started the apparatus. The start button turned on the light which illuminated the card and also started the timer. S looked at the card until he had decided which was the longer portion of the line, at which time he pushed either a right or left off button corresponding to the longer segment. The off button stopped the timer and turned the light off.

S was then asked to state his confidence level regarding the correctness of the immediately preceding judgment. (See below.) E then changed to another card and, after alerting S, started another cycle.

Confidence Level. As indicated above, S indicated his level of confidence in the correctness of each judgment. The instructions define the procedure used. "After making each judgment, you are to express your confidence that the judgment was correct in percentage terms that I shall define for you. By confidence we mean how sure you feel about it. Fifty per cent means average or medium confidence, the amount of confidence one usually has in most of one's judgments. Seventy-five per cent means confidence definitely above average, about the amount of confidence you have when you are quite sure you

are right. Similarly, 25 per cent means definitely below average confidence, the amount you have when you are guessing. One-hundred per cent is at the extreme end of the scale and means complete certainty, no possibility of error. Zero confidence is at the other end and means no confidence in your judgment whatever, that is, that you are just as likely to be wrong as right. You may use any percentage from zero to one-hundred. That is, you can say 5, 10, 20, 40, or any per cent that expresses your confidence. Do you have any questions?"

(These instructions were devised by Block (1).)

RESULTS

Judgment Speed Types. The first step taken in analyzing the results was to divide the group in terms of the speed of judgment on the psychophysical task. The 50 per cent of the subjects who were in the faster part of the distribution are called the "fast deciders." The 50 per cent in the slower half of the distribution are called "slow deciders." The range of individual mean scores for the fast group was 1.8 to 5.7 seconds and for the slow group 5.8 to 22.4 seconds.

The Minnesota Multiphasic Personality Inventory was scored for each subject and the mean raw scores on each scale were determined for the fast-deciding group and the slow-deciding group. (See Table 1.) The significances of the differences of the mean scores on the scales for the two groups were then tested. There were significant differences on two scales and differences which approached significance on two other scales.

TABLE 1

MMPI MEANS FOR SPEED GROUPS
(Raw Scores)

	Fast	Slow	t	p
?	2.5	3.0	.30	—
L	2.4	3.1	1.63	.20
F	5.0	4.2	1.07	—
K	14.8	16.8	1.94	.10
Hs	4.6	4.7	.12	—
D	18.4	19.5	1.00	—
Hy	20.2	21.5	1.25	—
Pd	16.2	14.4	1.88	.10
Mf	28.8	27.1	1.33	—
Pa	10.1	9.9	.27	—
Pt	13.1	10.9	1.31	—
Sc	13.1	9.6	2.11	.05
Ma	18.1	15.4	2.73	.01

The scale on which the difference was most significant was the Hypomania (Ma) Scale. The raw score mean on this scale for the fast-decision group was 18.0 and for the slow decision group was 15.4. This difference is clearly significant ($t = 2.73$, $p = .01$). The fast group's raw score mean on the Schizophrenia (Sc) Scale is 13.1 and the slow group mean is 9.6. This difference is statistically significant ($t = 2.11$, $p = .05$).

Possible differences on two other scales are of interest. On the Psychopathic Deviate (Pd) Scale, the fast group mean is 16.2 and the mean for the slow group is 14.4. The difference is not significant by usual standards but the significance level cannot be completely ignored in an exploratory study ($t = 1.88$, $p = .10$). Similarly, the slow group mean on one of the validation scales having to do with test taking attitude, the K Scale, is 16.8 and the mean of the fast group is 14.8. This difference is also large enough to approach significance ($t = 1.94$, $p = .10$).

The MMPI profiles are presented in Figure 1. It should be noted that these profiles are in standard score form and are corrected for K.

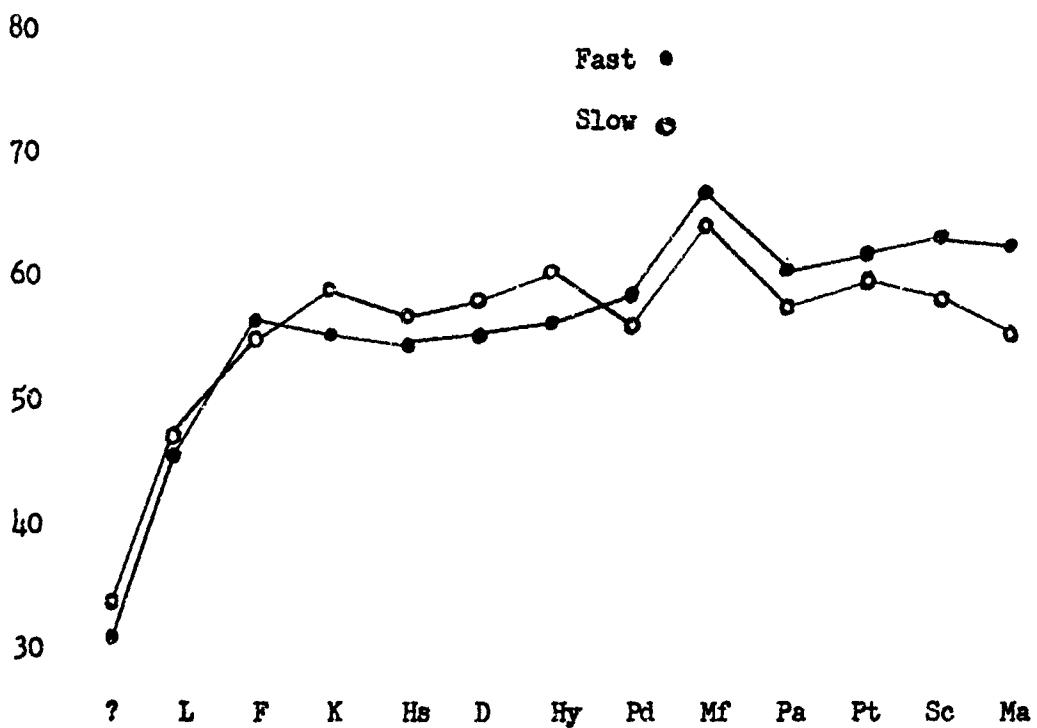


Figure 1--Profiles for the fast and slow judgment groups, in standard score form and corrected for K.

The results from the Adjective Check List for the slow and fast deciders are to be considered next. Here, a tabulation was made for each word showing how many of each of the groups selected the particular word as being characteristic of themselves. Thus, the proportion of each group selecting any given item could be compared with the proportion of the other group selecting that same item. Those where the difference between the proportions reached each of five levels of significance are presented in Table 2. All of the words noted were selected most often by the fast deciders.

TABLE 2
ADJECTIVES SELECTED DIFFERENTIALLY BY FAST AND SLOW DECIDERS

.001	.01	.02	.05	.10
curious	obliging	affected	foresighted	absent-minded
lazy	suggestible	boastful	ingenious	anxious
		dreamy	preoccupied	cheerful
			resourceful	coarse
			self-seeking	contented
			sentimental	efficient
			stingy	egotistical
			thoughtful	fearful
			versatile	flirtatious
				interests narrow
				loud
				resentful
				shy
				unaffected
				understanding
				wary
				witty

When the fast and slow groups are compared on the total number of items selected, it is found that the fast group mean of 111 is significantly greater than the slow group mean of 89 ($t = 3.20$, $p = .01$).

TABLE 3
NUMBER OF ADJECTIVES CHECKED

	N	M	σ	t	p
Fast	32	111	30.26		
				3.20	.01
Slow	32	89	26.08		

Confidence Types. For each S, the mean of the confidence levels for the more difficult half of the judgments was determined as was each S's mean

confidence level on the easier half of the judgments. The mean of the confidence scores for the more difficult judgments is 34 with a standard deviation of 17.3. For the easier judgments, the mean is 50 and the standard deviation is 20.1. These means differ significantly (C.R. = 12.81, $p = .0001$).

Three categories of confidence were used: High, Warranted, and Low. Ss were arranged in order according to their mean confidence level for easy judgments. They were again arranged according to their mean confidence level for hard judgments. Finally, they were arranged according to the difference between their hard and easy judgment means. Then, subjects who had high confidence, relative to the group, for both hard and easy judgments were assigned to the high confidence group. Those whose mean confidence scores were low, relative to the group, were assigned to the low confidence group. Those who had a relatively wide difference between their mean hard and easy confidence scores were assigned to the warranted confidence group. By employing these three procedural rules, the cases were divided among the categories such that each category contained approximately the same number of cases. While this procedure was not entirely automatic for all cases, the vast majority of assignments were simple and unambiguous. The mean confidence scores for each group are presented in Table 4.

TABLE 4

Group	Mean Hard Judgments	Mean Easy Judgments
High	53.19	67.71
Warranted	30.62	56.52
Low	18.68	28.09

The confidence level means for the warranted confidence group for the six difficulty levels are: Level 1 (hard) = 25.1, Level 2 = 28.7, Level 3 = 38.8, Level 4 = 49.9, Level 5 = 54.0, Level 6 = 66.7.

The MMPI results for the three confidence groups are the next matter for consideration. The mean scores for each group are presented in Table 5. There are no significant differences on any scales between the high confidence and the warranted confidence groups.

TABLE 5
MMPI MEANS FOR THE CONFIDENCE GROUPS

A. Means

	High	Warranted	Low
?	2.9	3.3	2.2
L	2.9	2.3	3.0
F	4.7	4.2	4.9
K	15.3	17.6	14.6
Hs	4.8	3.9	5.3
D	17.8	17.9	21.1
Hy	20.8	21.4	20.3
Pd	15.8	16.0	14.1
Mf	27.2	25.4	31.1
Pa	10.4	9.8	9.8
Pt	11.6	9.9	14.4
Sc	11.9	9.8	12.2
Ma	17.6	17.0	15.7

B. Significance of Differences

	High-Warranted		High-Low		Warranted-Low	
	t	p	t	p	t	p
?	.19	-	.87	-	.50	-
L	1.03	-	.16	-	1.17	-
F	.46	-	.19	-	.70	-
K	1.56	-	.48	-	2.13	.05
Hs	.85	-	.56	-	1.32	-
D	.08	-	2.12	.05	2.21	.05
Hy	.46	-	.32	-	.54	-
Pd	.11	-	1.17	-	1.54	-
Mf	1.06	-	2.41	.02	3.20	.01
Pa	.32	-	.49	-	.60	-
Pt	.71	-	1.18	-	2.13	.05
Sc	.81	-	.12	-	1.15	-
Ma	.46	-	1.16	-	.95	-

The most significant difference is between the warranted and low groups on the Masculinity-Femininity (MF) Scale ($t = 3.20$, $p = .01$). The warranted group mean is 25.4 and the low group mean is 31.1. There is also a significant difference between the high group mean which is 27.2 and the low group mean ($t = 2.41$, $p = .02$).

There are significant differences between the low and both the high and warranted groups on the Depression (D) Scale. The raw score means for these groups are 21.1 for the low, 17.8 for the high, and 17.9 for the warranted groups. Both the difference between the low and the high groups ($t = 2.12$, $p = .05$) and between the low and the warranted ($t = 2.21$, $p = .05$) are significant.

The MMPI profiles are given in Figure 2. It should be noted that the profiles are in standard scores and are corrected for K.

On the Psychasthenia (Pt) Scale, the low group mean of 14.4 is larger than the warranted group mean of 9.9 ($t = 2.13$, $p = .05$). On the K Scale, the warranted confidence group mean of 17.6 is significantly higher than the low confidence group mean of 14.6 ($t = 2.13$, $p = .05$).

Results from the Adjective Check List are presented in Tables 6, 7, and 8. The adjectives which were checked significantly more often by the high confidence group than by the other groups are shown in Table 6.

lla

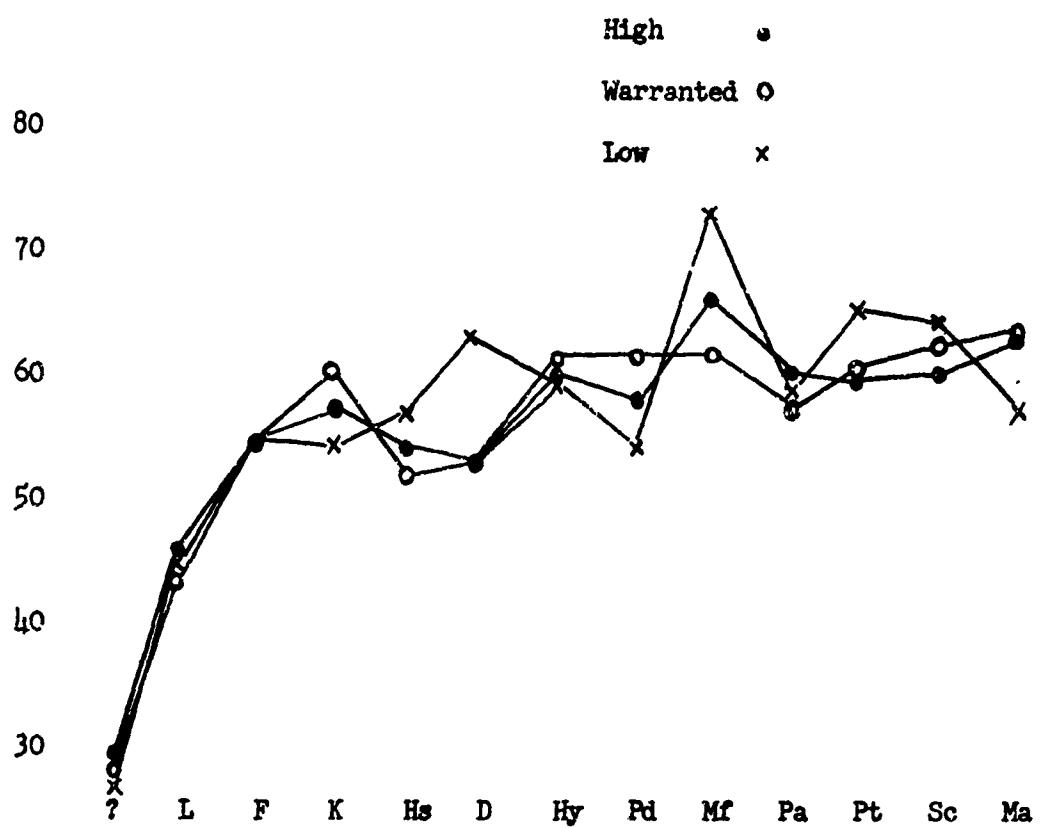


Figure 2--Profiles for the High, Warranted, and Low confidence groups, in standard score form and corrected for K.

TABLE 6
ADJECTIVES CHECKED PREDOMINANTLY BY HIGH GROUP

A. High Greater than Warranted

.05
conscientious
forceful
loud

B. High Greater than Low

.01 determined talkative	.02 hasty sociable	.05 adventurous cheerful complaining deliberate distractible easy-going	.10 healthy informal methodical painsaking reckless
--------------------------------	--------------------------	---	--

The adjectives which were checked more often by the warranted group than by the other groups are listed in Table 7.

TABLE 7
ADJECTIVES CHECKED MOST OFTEN BY WARRANTED GROUP

A. Warranted Greater than High

.10
defensive
interests wide
shy

B. Warranted Greater than Low

defensive deliberate easy-going leisurely optimistic patient selfish	cheerful persevering relaxed talkative
--	---

Those adjectives which were checked most often by the low group as compared with the other confidence groups are shown in Table 8.

TABLE 8
ADJECTIVES CHECKED COMPARATIVELY MOST OFTEN BY THE LOW GROUP

A. Low Greater than Warranted

.10
dignified
emotional
irritable

B. Low Greater than High

.05	.10
sensitive	reserved
shy	retiring
	withdrawn

When the three confidence groups are compared on total number of items checked, no significant differences are found. The means and standard deviations for each group are: High, $M = 105$, $\sigma = 29.7$; Warranted, $M = 104$, $\sigma = 30.9$; and Low, $M = 92$, $\sigma = 29.6$.

TABLE 9
DIFFERENCES BETWEEN NUMBER OF ADJECTIVES CHECKED

Difference between Means	High vs. Low	High vs. Warranted	Low vs. Warranted
	12.5	0.8	11.7
t	1.37	.08	1.26
p	N.S.	N.S.	N.S.

The low confidence group mean is sufficiently below the other two means so that one might expect to find a significant difference with larger samples of subjects.

DISCUSSION AND CONCLUSIONS

This study follows from one in which Johnson (2) had shown that speed of judgments and confidence in judgments have some generality from situation to situation and task to task. The overall purpose of the project is to explore the proposition that so-called personality characteristics may be related to elements of decision behavior. Thus, this study follows Johnson's and is in keeping with the overall purpose of the project.

The details of the study were influenced by work done by Block (1) who had presented data which he believes support the conclusion that there are variations among the personality characteristics of groups of persons who go about making the same judgments in the same situation in varied ways.

In the Block study, the Ss were rated by judges who had observed them over a period of three days in an assessment program. Thus, there is a major difference in his design and the design in this study, since the personality measures here are of the self-report type. It may very well be that these two methods of personality appraisal might yield very different relationships or even that one method might reveal significant relationships and the other method might not yield any significant relationships.

The personality measures selected for the present study cover a wide range of behaviors, attitudes, and feelings. Since this was an exploratory type of study, these measuring instruments seemed appropriate.

In the formation of groups, only two of the possibilities have been explored for purposes of this paper. The confidence groups parallel closely those formed by Block, and are based on the concept of appropriateness of the confidence level held. The selection of the groups involved some small

amount of ambiguity as a few cases did not fall obviously into one or another group. However, in the vast majority of the cases the assignment to a specific category was obvious when the case was compared with others. The present authors are confident that the groups are well defined by aspects of the performances utilized in assigning cases to categories.

The speed of judgment groups used in this study were defined by overall speed, whereas Block defined groups in terms of speed on hard and easy decisions. Thus, the results from these groups are not comparable.

In this study, the question must be raised as to whether or not there are enough differences of sufficient magnitude to be viewed as other than chance phenomena.

Regarding the MMPI results for the fast and slow groups, it is the case that there are 11 MMPI scales. It is reasonable to reject the notion that one would find by chance one difference significant at the .01 level, one difference significant at the .05 level, and two differences significant at the .10 level. Of course, one or more of these differences may be more significant than would be the case on a repeat sample so due caution is necessary in regard to conclusions formulated.

The present findings on the personality correlates of overall speed of judgment seem very reasonable. The fast group is higher than the slow group on the Ma scale of the MMPI, which is an indication of lack of restraint or impulsiveness. Characteristically, persons who are higher on Ma are given to more overproductivity of thought and action and tend to become involved in incidents because of lack of restraint. Certainly, this seems congruent with speed in judgment making where the person has been instructed to proceed in a natural way. The fast group is also higher on Sc than is the slow group.

The Sc scale was devised to reveal a lack of appropriate regard for reality as is extreme in schizophrenic psychotics. There is also the possible difference between the groups on the Pd scale. This difference indicates a less restrained, less conforming type of individual. Also, the lower K is consistent in a situation where there is no threat for the person.

This kind of interpretation is certainly rather subjective and impressionistic. However, it furnishes a general character description which can yield specific hypotheses for future test. In addition, the characterization as formed from the MMPI is immediately perceived as fitting with general expectations. This leads to the tentative general conclusion that speed of judgment is an aspect of personality which is part of a general character type as described above.

The levels of significance of the adjectives differentially chosen on the Adjective Check List do not furnish a firm basis for interpretation. There is little question that the fast group checks more adjectives than does the slow group. But the notion that there is a pattern of adjectives checked differentially by either or both groups is not supported. The adjectives which were checked more often by the fast group suggest that members of this group see themselves as being active though lazy, somewhat self-centered, somewhat emotional, and expansive in interpersonal relationships. That there are internal inconsistencies in this self-description is apparent from an examination of Table 2. This is not surprising in a group which tends to be high on Ma and Pd on the MMPI. However, this could also be the result of chance fluctuations. The results do not permit a conclusion.

The confidence groups were formed on the basis of measurements of actual judgment behavior and thus rest on criteria which have strong face validity. Since confidence was found by Johnson (2) to be fairly stable from time to

time and task to task, it is reasonable to believe that the composition of these groups would be little changed by additional judgment measurements. Also, the mean confidence levels are quite distinctly different for the three groups. Thus, the categorization is on a firm base in the sense that it reflects rather extreme differences among the members of this sample. A search for differential personality correlates among these groups seems justified as it would not be if the bases for categorization were less definite, i.e., if there had been more homogeneous performances by the subjects, overall. The mean confidence levels of the warranted confidence group for each level of judgment difficulty were calculated. These form an orderly progression, indicating that the subjects were working in the experimental situation. There seems, then, to be good reason to conclude that the confidence groups reflect varied performances among subjects who gave serious attention to the task.

The findings regarding the personality correlates are not sufficiently significant to support more than very tentative conclusions. The high and warranted confidence groups are essentially the same on the MMPI. The low confidence group seems to be different from the high and warranted groups on the Mf and D scales of the MMPI, i.e., the low confidence subjects are less masculine and more depressed. In addition, the low group tends to be lower on K and higher on Pt than is the warranted group. Overall, then, the low group has a more elevated profile than the warranted group and possibly more elevated than the high group. It is of interest that Block found that the warranted confidence group reflects what is believed to be more adequate adjustment than either the high or low confidence groups. The present study supports this view insofar as the low and warranted groups comparison is concerned and can be said to be significant. The two studies agree in finding that the low group is appropriately characterized as anxious, overly

introspective, and preoccupied with own problems, as indicated by the MMPI results.

The Adjective Check List results do not furnish the basis for any real conclusions, either. The trends which appear may very well be due entirely to chance. It is of interest that Block found the high confidence group should be described as overcontrolled, constricted, blustery and intolerant. The high group in the present study did select differentially more often adjectives suggesting an extraverted, energetic, chance-taking orientation mixed with a self-view of conscientiousness and deliberateness. These findings show some congruence. The warranted group seems to be somewhat more introspective than the high group but more relaxed and optimistic than the low confidence group. The low group reflects greater reserve, sensitivity, and emotionality than either of the other groups on the Adjective Check List. This is in close agreement with Block's results.

Overall, the results are not clear nor definite. There are certainly some indications that the so-called personality characteristics of an individual may be systematically related to the decision behavior manifest under conditions such as those employed in this study. There are a number of agreements between the results of this study and those of Block and these agreements furnish the basis for further investigations in this area.

SUMMARY

The goal of this study was to explore the proposition that aspects of decision behavior which have a satisfactory degree of generality from situation to situation and task to task are related to so-called personality characteristics. The dimensions of speed and confidence of judgment were selected for

study since they have been shown to be stable intraindividual characteristics. The personality measures employed were the MMPI and the Adjective Check List.

The sample of subjects was divided into a fast and a slow group on the basis of overall judgment speed. The fast group appears to be more impulsive and less conventional than the slow group. They seem to be overproductive in thought and action as compared with the slow group. The fast group checked more adjectives as being descriptive of themselves than did the slow group and the items which were checked differentially suggest that the fast group are more active and lazy, self-centered, and expansive in interpersonal relationships.

The sample was also divided into high confidence, warranted confidence, and low confidence groups. The MMPI did not differentiate the high and warranted groups, but the low group was revealed as being rather anxious, introspective, and concerned with problems. The findings from the Adjective Check List agree with those of the MMPI for the low confidence group. All conclusions regarding personality correlates of the confidence type must be held only very tentatively.

There are a number of agreements between the results from the present study and the results from a study by Block (1). This agreement between studies is sufficient to furnish the basis for further and more refined studies of the topic.

REFERENCES

1. Block, J. Some personality correlates of confidence and speed in a decision situation. Berkeley: Institute of Personality Assessment and Research, Univer. of California, Research Memorandum, 1954.
2. Johnson, L. C. Speed and confidence of judgment as psychological variables. Stanford: Dept. Psychol., Stanford Univer., Technical Report No. 4 (Contract Nonr 225-01), 1954.

REPORTS OF RESEARCH ON THINKING

A list of the technical reports and journal articles thus far available from the program of research on thinking being carried on in the Department of Psychology at Stanford is given below.

Technical Reports

NUMBER

Winder, C. L. Decision making. Stanford: Dept. Psychol., Stanford Univer., 1953 (Contract Nonr 225-01).

1. Sweeney, E. J. Sex differences in problem solving. Stanford: Dept. Psychol., Stanford Univer., 1953 (Contract N6onr 25125).
2. McNemar, Olga W. Word association, methods of deduction and induction, and reactions to set in good and poor reasoners. Stanford: Dept. Psychol., Stanford Univer., 1954 (Contract Nonr 225-02).
3. Wolff, W. M. Certainty: generality and relation to manifest anxiety. Stanford: Dept. Psychol., Stanford Univer., 1954 (Contract Nonr 225-01).
4. Johnson, L. C. Speed and confidence of judgment as psychological variables. Stanford: Dept. Psychol., Stanford Univer., 1954 (Contract Nonr 225-01).
5. Winder, C. L. & Wurtz, K. R. Some effects of induced success and failure on judgment behavior. Stanford: Dept. Psychol., Stanford Univer., 1954 (Contract Nonr 225-01).
6. Winder, C. L. & Wurtz, K. R. A study of personality correlates of judgment behavior. Stanford: Dept. Psychol., Stanford Univer., 1954 (Contract Nonr 225-01).
7. Dean, S. J. The generality of expectancy level as a function of set. Stanford: Dept. Psychol., Stanford Univer., 1954 (Contract Nonr 225-01).

Journal Articles

Adamson, R. E. Functional fixedness as related to problem solving: a repetition of three experiments. J. exp. Psychol., 1952, 44, 288-291.

Taylor, D. W. & Faust, W. L. Twenty questions: efficiency in problem solving as a function of size of group. J. exp. Psychol., 1952, 44, 360-368.

Taylor, D. W. Comments on "Human Problem-Solving." In Symposium on Psychology of Learning Basic to Military Training Problems (sponsored by Committee on Human Resources, Research and Development Board). May 8, 1953.

Hilgard, E. R., Irvine, R. P., & Whipple, J. E. Rote memorization, understanding, and transfer: an extension of Katona's card-trick experiments. J. exp. Psychol., 1953, 46, 288-292.

Adamson, R. E. & Taylor, D. W. Functional fixedness as related to elapsed time and to set. J. exp. Psychol., 1954, 47, 122-126.

Lawrence, D. H. & Coles, G. R. Accuracy of recognition with alternatives before and after the stimulus. J. exp. Psychol., 1954, 47, 208-214.

Hilgard, E. R. Can we train better problem solvers? Instructor's J., 1954, 5, 15-21 (Air Training Command, U.S. Air Force).

Hilgard, E. R., Edgren, R. D., & Irvine, R. P. Errors in transfer following learning with understanding: further studies with Katona's card-trick experiments. J. exp. Psychol., 1954, 47, 457-464.

Hoffman, P. J., Festinger, L., & Lawrence, D. H. Tendencies toward group comparability in competitive bargaining. Human Relations, 1954, in press.